APPLICATION FOR INCIDENTAL HARASSMENT AUTHORIZATION FOR ON-ICE SEISMIC OPERATIONS IN THE BEAUFORT SEA

Submitted by ConocoPhillips Alaska, Inc. (CPA)

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1 Description of the Specific Activity or Class of Activities that can be Expected to Result in Incidental Taking of Marine Mammals

The scope of this application is limited to deep seismic exploration activities during the ice-covered season in state waters and in the Outer Continental Shelf in the Beaufort Sea, offshore Alaska defined in the following section. The energy source for the proposed activity will be vibroseis. A description of seismic exploration and the specific activities that may take place during the period covered in the Incidental Harassment Authorization (IHA) application is provided below.

Reflection Seismic Exploration

Deep seismic surveys use the "reflection" method of data acquisition. Reflection seismic exploration is the process of gathering information about the subsurface of the earth by measuring acoustic (sound or seismic) waves, which are generated on or near the surface. Acoustic waves reflect at boundaries in the earth that are characterized by acoustic impedance contrasts. The acoustic impedance of a rock layer is its density multiplied by its acoustic velocity. Geologists and geophysicists commonly attribute different rock characteristics to different acoustic impedances. Seismic exploration uses a controlled energy source to generate acoustic waves that travel through the earth (including sea ice and water, as well as sub sea geologic formations), and then uses ground sensors to record the reflected energy transmitted back to the surface. Energy that is directed into the ground takes on numerous forms. When acoustic energy is generated, compression (p) and shear (s) waves form and travel in and on the earth. The compression and shear waves are affected by the geological formations of the earth as they travel in it and may be reflected, refracted, diffracted or transmitted when they reach a boundary represented by an acoustic impedance contrast.

The basic components of a seismic survey include an energy source (either acoustic or vibratory), which generates a seismic signal; hydrophones or geophones, which receive the reflected signal; and electronic equipment to amplify and record the signal. The number and placement of sensors, the energy sources, the spacing and placement of energy input locations, and the specific techniques of recording reflected energy are broadly grouped as "parameters" of a given exploration program.

In modern reflection seismology, many sensors are used to record each energy input event. The number of sensors in use for each event varies widely according to the type of survey being conducted and the recording equipment available. Common numbers of groups of sensors are 240, 480, and 1040, and some new recording instruments may use as many as 4000 groups of sensors at the same time. The sensors are normally placed in one or more long lines at specified intervals. In North America the common group placement intervals are multiples of 55 feet (17 meters), 110 feet (33.5 meters) and 220 feet (67 meters).

Vibroseis seismic operations use large trucks with vibrators that systematically put variable frequency energy into the earth. At least 1.2 m (4 ft) of sea ice is required to support heavy vehicles used to transport equipment offshore for exploration activities. These ice conditions generally exist from 1 January until 31 May in the Beaufort Sea. The exploration techniques are most commonly used on landfast ice, but they can be used in areas of stable offshore pack ice. Several vehicles are normally associated with a typical vibroseis operation. One or two vehicles with survey crews move ahead of the operation and mark

the energy input points. Crews with wheeled vehicles often require trail clearance with bulldozers for adequate access to and within the site. Crews with tracked-vehicles are typically limited by heavy snow cover, and may require trail clearance beforehand.

A typical wintertime exploration seismic crew consists of 40-110 personnel. Roughly 75 percent of the personnel routinely work on the active seismic crew, with approximately 50 percent of those working in vehicles and the remainder outside laying and retrieving geophones and cable.

Vibroseis

With the vibroseis technique, activity on the surveyed seismic line begins with the placement of sensors. All sensors are connected to the recording vehicle by multi-pair cable sections. The vibrators move to the beginning of the line, and recording begins. The vibrators move along a source line, which will be at some angle to a sensor line. The vibrators begin vibrating in synchrony via a simultaneous radio signal to all vehicles.

In a typical survey, each vibrator will vibrate four times at each location. The entire formation of vibrators subsequently moves forward to the next energy input point *(e.g.,* 67 m [220 ft] in most applications) and repeats the process. In a typical 16- to 18-hour day, a survey will complete 4 to 10 linear miles (6 to 16 km) in 2D seismic operations and 15 to 40 linear miles (24 to 64 km) in a 3D seismic operation.

2 The Date(s) and Duration of Such Activity and the Specific Geographical Region Where it will Occur

CPA seeks incidental take authorization for a period of five months (1 January through 31 May 2004). On-ice seismic operations are ordinarily confined to this five-month period since ice is sufficiently thick (4-5 ft) to safely support the equipment. The geographic region of activity encompasses an 846-square mile-area extending from approximately Cape Halkett on the west to Oliktok Point on the east and to approximately 4-20 nautical miles offshore (See Figure 1). Water depths in most (> 60%) of the area are less than 10 ft (3 meters), but drop to 30 ft (9 meters) along the northern fringe of the region of activity. Few seals inhabit water less than 3 meters during winter, since water typically freezes to or near the bottom at this depth or what water is available supports few food resources (Miller et al. 1998 and Link et al.1999).

3 Species and Numbers of Marine Mammals Likely to be Found within the Activity Area

The activity area is located within the range of a number of marine mammal species. The species regulated by the NMFS that may be present during the proposed period of activity (1 January through 31 May) are the ringed and bearded seals. Most of the activity area is marginal seal habitat, since over 60% of the area is less than 3 meters deep.

Not taking into account water depth, the estimated number of ringed seals potentially in the 846-square mile (2,190 km^2) activity area is less than 3,900 animals. This estimate is based on a density of 1.73 seals per kim^2, which was derived from the most current aerial surveys of the region. Frost and Lowry (1999) reported an observed density of 0.61 ringed seals per km2 on the fast ice from aerial surveys conducted in spring 1997 of an area (Sector B2) overlapping the activity area, which is in the range of densities (0.28-0.66) reported for the Northstar project from 1997 to 2001 (Moulton et al. 2001). This value (0.61) was adjusted to account for seals hauled out but not sighted by observers (x 1.22, based on Frost et al. (1988)) and seals not hauled out during the surveys (x 2.33, based on Kelly and Quakenbush (1990)) to obtain the 1.73 seal per km2. This estimate covered an area from the coast to about 2-20 miles beyond the activity area, and it assumed that habitat conditions were uniform and, therefore, it was not adjusted for water depth. Since a high proportion (> 60%) of the activity area is within water less than 3 m deep, which

Insert for Figure 1

Moulton et al. (2001) reported for Northstar supported about five times fewer seals (0.12 – 0.13 seals/km^2) than that (0.61) reported by Frost and Lowry, the actual number of ringed seals is probably closer to slightly more than half of the 3,900 seals or about **2,000** seals[1]. Observed densities of ringed seals reported over 15 years ago in the region of the activity area from 1985 through 1987 (0.85, 1.09, and 1.11 seals per km²) were not used in this analysis, since an estimate was available within the last five years (Frost and Lowry1999).

There are no reliable estimates for bearded seals in the Beaufort Sea or in the activity area (Angliss et al. 2001), but recent surveys show that few bearded seals inhabit the activity area during December through May. An indication of their low numbers is provided by the results of aerial surveys conducted east of the activity area near the Northstar and Liberty development sites. Three to 18 bearded seals were observed in these areas compared to 1,911 to 2,251 ringed seals in the spring (May/June) of 1999 through 2001 (Moulton et al. 2001, Moulton and Elliott 2000, and Moulton et al. 2000). Similarly small numbers of bearded seals would be expected to occur in the activity area, where habitat is even less favorable because of the high proportion of shallow water area.

4 A Description of the Status, Distribution, and Seasonal Distribution (When Applicable) of the Affected Species or Stocks or Marine Mammals Likely to be Affected by such Activities

Ringed and to a lesser degree bearded seals could be affected by on-ice seismic activities. Neither species is designated as a depleted stock by the Marine Mammals Protection Act (MMPA) or is listed by the federal government as threatened or endangered. These species as well as other marine mammal species in the Beaufort Sea appear to have stable to increasing populations, which is a condition indicative of a healthy ecosystem. Polar bears, which prey on these species, are believed to be stable or increasing in numbers in the Beaufort Sea (USFWS 2000 a, b). Similarly, the most recent estimate of bowhead whales shows the population has steadily increased annually at a growth rate of 3.4% (95% CI of 2.1-4.8%) to 10,020 (95% CI of 7,800-12,900) animals (SC/55/BRG7, IWC 2002). These increases are occurring in concert with subsistence harvest of these species including a five-year harvest quota of 255 bowheads. The status of these marine mammal populations reflects the high quality of the habitat, which supports abundant and diverse prey populations.

Ringed seals are year-round residents in the Beaufort Sea. They are the most abundant and widely distributed species of marine mammal in the Beaufort Sea (Frost et al. 1988). The worldwide population is estimated at 6 to 7 million (Stirling and Calvert 1979). The Alaska stock of the Bering-Chukchi-Beaufort Sea area is roughly estimated at 1 to 1.5 (Frost 1985) or 3.3 to 3.6 million seals (Frost et al. 1988). Although there are no recent population estimates in the Beaufort Sea, Bengston et al. (2000) estimated ringed seal abundance from Barrow south to Shismaref in a portion of the Chukchi Sea to be 245,048 animals from aerial surveys flown in 1999. The authors of the NMFS 2001 Stock Assessment Report stated that there are at least as many ringed seals in the Beaufort Sea (Angliss et al. 2001). Frost et al. (1999) reported that observed densities within the area of industrial activity along the Beaufort Sea coast were generally similar between 1985-87 and 1996-98, suggesting that the regional population has been relatively stable during this 13-year period of industrial activity.

During winter and spring, ringed seals inhabit landfast ice and offshore pack ice. Seal densities are highest on stable landfast ice but significant numbers of ringed seals also occur in pack ice (Wiig et al.

[1] The value was derived as follows:
1,314 km^2 x 0.13 x 1.22 x 2.33 = 486 seals in area having water depths of 0-3 meter (60%) in activity area.
876 km^2 x 0.61 x 1.22 x 2.33 = 1,519 seals in area having water depths over 3 meters (40%) in activity area.
Combining the two numbers gives an estimate of 2,005 seals or approximately 2,000 for the entire activity area.

1999). Seals congregate at holes and along cracks or deformations in the ice (Frost et al. 1999). Breathing holes are established in landfast ice as the ice forms in autumn and maintained by seals throughout winter. Adult ringed seals maintain an average of 3.4 holes per seal (Hammill and Smith 1989). Some holes may be abandoned as winter advances in order for seals to probably conserve energy by maintaining fewer holes (Brueggeman and Grialou, 2001). As snow accumulates, ringed seals excavate lairs in snowdrifts surrounding their breathing holes, which they use for resting and for the birth and nursing of their single pups in late March to May (McLaren 1958, Smith and Stirling 1975, Kelly and Quakenbush 1990)). Pups have been observed to enter the water, dive to over 10 m, and return to the lair as early as 10 days after birth (Brendan Kelly, personal communications, June 2002), suggesting pups can survive the cold water temperatures at a very early age. Mating occurs in late April and May. From mid-May through July, ringed seals haul out in the open air at holes and along cracks to bask in the sun and molt. Most on-ice seismic activity occurs from January through May.

The seasonal distribution of ringed seals in the Beaufort Sea is affected by a number of factors but a consistent pattern of seal use has been documented since monitoring began over 20 years ago by using aerial surveys. Seal densities have historically been substantially lower in the western than the eastern part of the Beaufort Sea (Burns and Kelly 1982, Kelly 1988). Frost et al. (1999) reported consistently lower ringed seal densities in the western versus eastern sectors they surveyed in the Beaufort Sea during 1996, 1997, and 1998. The relatively low densities appear to be related too much of the area occurring between the shore and the barrier islands, which is generally shallow. This area of historically low ringed seal density is also the focus for much of the recent on-ice seismic surveys.

The bearded seal inhabits the Bering, Chukchi, and Beaufort seas (Burns and Frost 1979). Numbers are considerably higher in the Bering and Chukchi seas, particularly during winter and early spring. Early estimates of bearded seals in the Bering and Chukchi seas range from 250,000 to 300,000 (Popov 1976, Burns 1981). Reliable estimates of bearded seal abundance in Alaska waters are unavailable. Based on the available data there is no evidence of a decline in the bearded seal population. Bearded seals are generally associated with pack ice and only rarely use shorefast ice (Burns and Harbo 1972). Bearded seals occasionally have been observed maintaining breathing holes in annual ice and even hauling out from holes used by ringed seals (Mansfield 1967, Stirling and Smith 1977). However, since bearded seals are normally found in broken ice that is unstable for on-ice seismic operation, bearded seals will be rarely encountered during seismic operations.

5 The Type of Incidental Taking Authorization that is Being Requested (i.e., Takes By Harassment Only; Takes by Harassment, Injury and/or Death) and the Method of Incidental Taking

CPA is requesting authorization for incidental taking by harassment (Level B as defined in 50 CFR 216.3) of small numbers of ringed and bearded seals during on-ice seismic activity. The activity includes the use of vibroseis energy source to collect seismic data. This activity is not likely to result in physical injuries to, and/or death of, any individual seal. Seals are expected to avoid the immediate area around the on-ice seismic operations. Given the level of vibroseis sounds and the tendency of ringed seals to avoid the immediate area around on-ice seismic operations, seals are not expected to be subject to potential hearing damage from exposure to underwater or in-air sounds from that operation. No intentional taking of any marine mammal is planned at any time during the seismic data collection operation.

6 By Age, Sex, and Reproductive Condition (if Possible), the Number of Marine Mammals (By Species) that May be Taken by Each Type of Taking Identified in Paragraph (A)(5) of This Section, and the Number of Times such Takings by Each Type of Taking are Likely to Occur.

CPA seeks to take small numbers of ringed seals and, if encountered, very small numbers of bearded seals. Any takes are anticipated to result from short-term disturbances by noise and physical activity

associated with on-ice seismic operations. While operations have the potential to disturb and temporarily displace some seals, any impacts will likely be confined to small numbers of seals in the immediate vicinity of the activities.

Burns and Kelly (1982) concluded that displacement of ringed seals in close proximity (within 150 m) to seismic lines does occur, and ringed seal pupping in shorefast ice habitats within this distance of an on-ice shot line in favorable ringed seal habitat is likely to be disturbed by operations. However the disturbance is not likely to have any effect on the population as a whole due to the following:

- limited area of seismic surveys;
- non-random distribution of ringed seals;
- avoidance by seismic operator of optimal seal habitat (areas of extensive pressure ridging and snow accumulation) due to safety and operational constraints;
- occurrence of most of the on-ice seismic surveys in shallow and near shore waters where ringed seal densities are extremely low;
- the relatively large size of the ringed seal population in the Beaufort Sea and throughout Alaska; and
- the lack of evidence of on-ice seismic activity negatively affecting the reproductive viability or distribution of the ringed seal population.

Aerial survey data collected from 1985 to 1987 and 1997 indicate that ringed seal densities in the fast ice of the region of the activity area as well as among different section of the Beaufort Sea are highly variable among years (Frost et al. 1999). The reported inter-annual variability in overall average density during these years in the region of the activity area was 0.61 to 1.11 seals per km^2. Based on an estimated rate of temporary displacement determined by Burns (1981) of 0.6 ringed seals per nm^2 (0.52 per mile) of area subjected to seismic activity, a maximum of 832 seals could be displaced from 1,600 miles of seismic surveys assuming a uniform distribution. However, since the distribution is not uniform and most of the activity area is marginal habitat for seals, considerably fewer seals would be temporarily displaced by the seismic operations. Furthermore, the proposed seismic operations will be concentrated in 143 mi^2 or about 17% of the 846 mi^2 activity area. Consequently, a more accurate maximum upper limit of the potential take of ringed seals by the proposed seismic operations is 340 (17% x 2000 seals) animals. The lower limit of potential take of ringed seals would be few if any if seismic activity is entirely conducted in water less than 3 m deep.

Pup mortality could occur if any of these animals were nursing and displacement was protracted. However, it is highly unlikely that a nursing female would abandon her pup given the normal levels of disturbance from the proposed activities and the typical movement patterns of ringed seal pups among different holes as reported by Lydersen and Hammill (1993). Similarly, Kelly and Quakenbush (1990) observed that radio-tagged seals used as many as four lairs spaced as far as 3,437 m apart, with mean distances for males equaling 1,997 m and for females 634 m. In addition, seals have multiple breathing holes. Pups may use more holes than adults (mean 8.7), but the holes are generally closer together (Lydersen and Hammill 1993). Holes have been found as far apart as 0.9 km (0.56 miles). This pattern of use indicates that adult seals and pups can move away from seismic activities, particularly since the seismic equipment does not remain in any specific area for a prolonged time. Given these consideration combined with the small proportion (<1%) of the population potentially disturbed by the proposed activity, impacts are expected to be negligible for the overall ringed and also bearded seal populations.

7 The Anticipated Impact of the Activity on the Species or Stock

The anticipated impact of seismic activities on the species or stock of ringed and bearded seals is expected to be negligible for the following reasons.

- The activity area supports a small proportion (<1 %) of the ringed populations in the Beaufort Sea.
- Most of the seismic lines will be on ice over shallow water where ringed seals are absent or present in very low abundance. Over 60% of the activity area is near shore and/or in water less than 3 m deep, which is generally considered poor seal habitat. Moulton et al. (2001) reported that only 6% of 660 ringed seals observed on ice in the Northstar project area were in water between 0-3 m deep.
- Seismic operators will avoid moderate and large pressure ridges, where seal and pupping lairs are likely to be most numerous, for reasons of safety and because of normal operational constraints.
- Many of the on-ice seismic lines and connecting ice roads will be laid out and explored during January and February when many ringed seals are still transient and considerably before the spring pupping season.
- The sounds from energy produced by vibrators used during on-ice seismic programs typically are at frequencies well below (1000 Hz) those used by ringed seals to communicate. Thus, ringed seal hearing is not likely to be very good at those frequencies and seismic sounds are not likely to have strong masking effects on ringed seal calls. This effect is further moderated by the quiet intervals between seismic energy transmissions.
- There has been no major displacement of seals away from on-ice seismic operations (Frost and Lowry 1988). Further confirmation of this lack of major response to industrial activity is illustrated by the fact that there has been no major displacement of seals near the Northstar Project. Studies at Northstar have shown a continued presence of ringed seals throughout winter and creation of new seal structures (Williams et al. 2001, Moulton et al. 2003). The scale of activities at the Northstar Project is magnitudes greater than the proposed on-ice seismic operations.
- Although seals may abandon structures near seismic activity, studies have not demonstrated a cause and effect relationship between abandonment and seismic activity or biologically significant impact on ringed seals. Studies by Williams et al. (2001), Kelley et al. (1986,1988) and Kelly and Quakenbush (1990) have shown that abandonment of holes and lairs and establishment or re-occupancy of new ones is an ongoing natural occurrence, with or without human presence. Link et al (1999) compared ringed seal densities between areas with and without vibroseis activity and found densities were highly variable within each area and inconsistent between areas (densities were lower for 5 days, equal for 1 day, and higher for 1 day in vibroseis area), suggesting other factors beyond the seismic activity likely influenced seal use patterns. Consequently, a wide variety of natural factors influence this patterns of seal use including time of day, weather, season, ice deformation, ice thickness, accumulation of snow, food availability and predators as well as ring seal behavior and populations dynamics.

Consequently, the effects of on-ice seismic are expected to be limited to short-term and localized behavioral changes involving relatively small numbers of seals. NMFS came to a similar finding in an Environmental Assessment of on-ice seismic activity in the Beaufort Sea, where they concluded that behavior changes were expected to be, at worst, negligible (NMFS 1998). The effects of the proposed on-ice seismic operations fall within the MMPA definition of Level B harassment.

In winter, bearded seals are restricted to cracks, broken ice, and other openings in the ice. On-ice seismic operations avoid those areas for safety reasons. Therefore, any exposure of bearded seals to on-ice

seismic operations would be limited to distant and transient exposure. Bearded seals exposed to a distant on-ice seismic operation might dive into the water. Consequently, no significant effects on individual bearded seals or their population are expected, and the number of individuals that might be temporarily disturbed would be very low.

8 The Anticipated Impact of the Activity on the Availability of the Species or Stocks of Marine Mammals for Subsistence Uses

Residents of the village of Nuiqsut are the primary subsistence users in the activity area. The subsistence harvest during winter and spring is primarily ringed seals, but during the open-water period both ringed and bearded seals are taken. Nuiqsut hunters may hunt year round; however in more recent years most of the harvest has been in the summer during open water instead of the more difficult hunting of seals at holes and lairs (McLaren 1958, Nelson 1969). The most important area for Nuiqsut hunters is off the Colville River Delta in Harrison Bay, between Fish Creek and Pingok Island (149°40' W), which corresponds to approximately the eastern half to the activity area. Seal hunting occurs in this area by snow machine before spring break-up and by boat during summer. Subsistence patterns are reflected in harvest data collected in 1992 where Nuiqsut hunters harvested 22 of 24 ringed seals and all 16 bearded seals during the open water season from July to October (Fuller and George, 1997). Harvest data for 1994 and 1995 show 17 of 23 ringed seals were taken from June to August, while there was no record of bearded seals being harvested during these years (Brower and Opie, 1997). Consequently, only a small number of ringed seals was harvested during winter to spring period, which corresponds to the time of the proposed on-ice seismic operations.

Based on harvest patterns and other factors described below, on-ice seismic operations in the activity area are expected to have no more than a negligible impact on subsistence uses of ringed and bearded seals because:

- Seismic operations would end before spring breakup, after which subsistence hunters' harvest most seals.
- Seismic operations would temporarily displace relatively few seals, since most of the habitat in the activity area is marginal to poor and supports relatively low densities of seals during winter. Displaced seals would likely move a short distance and remain in the area for potential harvest by native hunters (Frost and Lowry 1988, Kelly et al. 1988). Studies at the Northstar Project, which is much larger than the proposed seismic operation, found no evidence of the project activities affecting the availability of seals for subsistence hunters; however, the Northstar vicinity is outside the areas used by subsistence hunters (Williams and Moulton, 2001). NMFS similarly concluded in the promulgating regulations to renew taking of ringed and bearded seals incidental to on-ice seismic activities, offshore Alaska, for a period of 5 years ending in December 2002 that the activity would have a negligible impact on the species or stock and not have an unmitigatable adverse impact on the availability of these species for subsistence uses (Federal Register, 1997)
- The area where seismic operations would be conducted is small compared to the large Beaufort Sea subsistence hunting area associated with the extremely wide distribution of ringed seals.
- To the maximum extend practicable, offshore vibroseis activities in Harrison Bay would progress in a westward direction and from deeper water shoreward to minimize disturbance to any subsistence hunting that may occur during seismic operations. If subsistence hunting occurred during winter it would primarily be in the eastern half of Harrison Bay.

In order to further minimize any effect of seismic operations on the availability of seals for subsistence, crews will be required by CPA to avoid hunters and the locations of any seals being hunted in the activity area, whenever possible.

9 The Anticipated Impact of the Activity upon the Habitat of the Marine Mammal Populations, and the Likelihood of Restoration of the Affected Habitat.

The only potential effect of seismic survey operations on ringed seal habitat would be ice road and camp construction and the removal of ice and snow along survey lines, camps, and roadways. Because the area affected represents only a very small part of the Beaufort Sea seal habitat, and the habitat is naturally restored annually, any impacts would be very localized and temporary. Habitat restoration is often immediate, occurring during the first episode of snow and wind that follows passage of the equipment. Periodic storms are common in the Beaufort Sea. Moreover, seismic survey crews do not place energy sources over observed seal holes or lairs, nor do they typically operate along pressure ridges or near the edge of the land fast ice where seal structures are often located.

Because bearded seals are largely restricted to areas with cracks or other openings in the ice, and because on-ice seismic operations must avoid these areas for safety reasons, little, if any bearded seal habitat would be impacted by seismic operations.

Consequently, the anticipated impact of on-ice seismic activity upon the habitat of ringed and bearded seal populations would be negligible because disturbance would be very localized, short term and quickly restored back to a natural condition.

10 The Anticipated Impact of the Loss or Modification of the Habitat on the Marine Mammal Populations Involved

As discussed in Item 9 above, the only losses of or modifications to ringed or bearded seal habitats from on-ice seismic operations are the temporary change of the surface ice associated with ice road construction and removal of ice and snow along survey lines, camps, and roadways. In all cases, the modification involves a very small proportion of the total area of habitat available to ringed and bearded seals. Because seismic operations tend to avoid rough, deformed, and broken ice, cracks, and areas near the edge of the landfast ice, they also avoid the preferred habitat of ringed and bearded seals. Disturbed habitat is often immediately restored by periodic storms. Furthermore, since the ice and snow are restored annually by the melting and reformation of sea ice, no impact to habitat would last beyond spring breakup. Consequently, on-ice seismic activities will have a negligible impact on ringed and bearded seal populations and their habitats.

11 The Availability and Feasibility (Economic and Technological) of Equipment, , Methods, and Manner of Conducting Such Activity or means of Effecting the Least Practicable Adverse Impact upon the Affected Species or Stocks, Their Habitat, and on Their Availability for Subsistence Uses, Paying Particular Attention to Rookeries, Mating Grounds, and Areas of Similar Significance.

The number of individual ringed and bearded seals likely to be exposed to on-ice seismic operations is expected to be low. Effects on most individual seals are expected to be limited to localized and temporary displacement (Level B Harassment). No greater than a negligible impact is anticipated on the species or stock or the availability of the species for subsistence uses. Moreover, any effects on ringed or bearded seal habitat are expected to be temporary, localized, and largely limited to a relatively small area along the northern fringe of the activity area. Most of the activity area supports marginal to poor seal habitat because of the shallow water depths of a large proportion of the area. No rookeries, areas of concentrated feeding or mating, or other areas of special significance to marine mammals occur in or near the planned seismic operation area.

Nevertheless, all activities will continue to be conducted to assure the least practical adverse impact on the species, habitat, and availability for subsistence uses. For example, as required under current regulations, all activities will be conducted as far as practicable from any observed ringed or bearded seal or ringed seal lair and no energy source will be placed over an observed ringed seal lair as per 50 C.F.R. § 216.113. Similarly, only vibrator-type energy-source equipment shown to have similar or lesser effects will be use as per 50 C.F.R. § 216.113(a)(1). CPA will also provide training for the seismic crews so they can recognize potential areas of ringed seal lairs and adjust the seismic operations accordingly. There have been no injuries or deaths of seals or no more than temporary displacement of seals by on-ice seismic operations since NMFS instituted regulations. Consequently, the history of industry has been one of responsible operations of on-ice seismic activities relative to seals, their habitat, and use by subsistence hunters in Alaska.

To further ensue that on-ice seismic operations have the least practicable impact on the species, habitat and subsistence use, CPA will continue to work with NMFS, other Federal agencies, the State of Alaska, Native communities of Barrow and Nuiqsut, and ICAS to assess measures to further minimize any impact from seismic activity. In addition, a Plan of Cooperation will be developed between CPA and Nuiqsut to assure that seismic activities do not interfere with subsistence harvest of ringed or bearded seals. Furthermore, if seismic operations go beyond March 20 in waters deeper than 3 meters, a survey using trained dogs will be completed to identify active seal holes/ birthing lairs or hole/lair habitats so they can be avoided by seismic operations to the greatest extent practicable. If trained dogs are not available, potential habitat will be identified by trained marine mammal biologists based on the characteristics of the ice (i.e., deformation, cracks, etc.).

12 Where the Proposed Activity Would Take Place in or Near a Traditional Arctic Subsistence Hunting Area and/or May Affect the Availability of a Species or Stock of Marine Mammal for Arctic Subsistence Uses, the Applicant Must Submit Either a Plan of Cooperation or Information that Identifies What Measures have Been Taken and/or Will be Taken to Minimize any Adverse Effect on the Availability of Marine Mammals for Subsistence Uses

CPA's on-ice seismic operations should have no more than a negligible impact on subsistence uses of ringed or bearded seals because seal numbers are low in the activity area, there is no evidence of on-ice seismic activities more than temporarily disturbing seals, seismic crews will be instructed to avoid hunters or seals being hunted, most of the activity will take place in waters < 3 meters deep, and most subsistence hunting occurs in summer during open water. CPA will consult with subsistence hunters of Nuiqsut and

provide the community, North Slope Borough, and ICAS information about the planned activities (timing and extent) before initiating any on-ice seismic program.

13 The Suggested Means of Accomplishing the Necessary Monitoring and Reporting that will Result in Increased Knowledge of the Species, the Level of Taking or Impacts on the Population of Marine Mammals That are Expected to be Present While Conducting Activities and Suggested Means of Minimizing Burdens By Coordinating Such Reporting Requirements with Other Schemes Already Applicable to Persons Conducting Such Activity. Monitoring Plans Should Include a Description of The Survey Techniques That Would Be Used to Determine the Movement and Activity of Marine Mammals Near The Activity Site(s) Including Migration and Other Habitat Uses, Such As Feeding.

Ringed seal pupping occurs in lairs from late March to mid-to-late April (Smith and Hammill 1981). Prior to commencing on-ice seismic surveys in mid-March, a survey using experienced field personnel and trained dogs will be conducted to identify and determine the status of potential seal structures along the planned on-ice transit routes. The seal structure survey will be conducted before selection of precise transit routes to ensure that seals, particularly pups, are not injured by equipment. The locations of all seal structures will be recorded by GPS, staked, and flagged with surveyor's tape. Surveys will be conducted 150m to each side of the transit routes. Actual width of route may vary depending on wind speed and direction, which strongly influence the efficiency and effectiveness of dogs locating seal structures. Survey will only be conducted in the portions of the activity area where water depths exceed 3 meters. Few, if any, seals inhabit ice-covered waters below 3 meters due to water freezing to the bottom or poor prey availability caused by the limited amount of ice-free water.

The level of take, while anticipated to be negligible, will be assessed by conducting a second seal structure survey shortly after the end of the seismic surveys. A single on-ice survey will be conducted by biologists on snowmachines using a GPS to relocate and determine the status of seal structures located during the initial survey. The status (active vs. inactive) of each structure will be determined to assess the level of incidental take by seismic operations. The number of active seal structures abandoned between the initial survey and the final survey will be the basis for enumerating take. If dogs are not available for the initial survey, take will be determined by using observed densities of seals on ice reported by Moulton et al. (2001) for the Northstar project, which is approximately 20 nm from the eastern edge of the proposed activity area.

In the event that seismic surveys can be completed in that portion of the activity area deeper than 3 meters before mid-March, no field surveys would be conducted of seal structures. Under this scenario, surveys would be completed before pups are born and disturbance would be negligible. Therefore, take would be determined for only that portion of the activity area exposed to seismic surveys after mid-March, which would be in water 3 m or less deep. Take for this area would be estimated by using the observed density (13/100 km^2) reported by Moulton et al. (2001) for water depths between 0-3 meters in the Northstar project area, which is the only source of an density estimate stratified by water depth for the Beaufort Sea. This would be an overestimation requiring a substantial downward adjustment to reflect the actual take of seals using lairs, since few if any of the structures in these water depths would be used for birthing, and Moulton et al. (2001) estimate includes all seals.

The methods may be refined after the IHA application has been reviewed by NMFS. If additional activities will be ongoing in the Beaufort Sea in 2003-2004, CPA will coordinate its monitoring programs with other industries if applicable. Monitoring and reporting of the on-ice seismic operation will follow the requirements listed under 50.C.F.R. § 216.114.

14 Suggested Means of Learning of, Encouraging, and Coordinating Research Opportunities, Plans, and Activities Relating to Reducing such Incidental taking and Evaluating its Effects.

On-ice operations have been conducted in the Beaufort Sea region for over 25 years and, during this time, there have been no noticeable adverse impacts on the ringed or bearded seal populations or the availability of the species for subsistence uses. Moreover, any effects on seal habitat have been temporary and localized.

However, to further ensure that there will be no adverse effects resulting from on-ice operations, CPA will continue to cooperate with the NMFS, MMS, other appropriate federal agencies, the State of Alaska, the North Slope Borough, ICAS, and Nuiqsut community to coordinate research opportunities and assess all measures than can be taken to eliminate or minimize any impacts from these activities.

Literature Cited

Angliss, R.P., A. Lopez and D.P. DeMaster. 2001. Draft Alaska marine mammal stock assessments 2001. National Marine Mammal Laboratory, Alaska Fisheries Science Center, Seattle, WA. 181 pp.

Bengtson, John L., et al. 2000. Abundance and distribution of ringed seals (*Phoca hispida*) in the coastal Chukchi Sea, Alaska, May-June 1999, pp. 149-159 *In*: Anita L. Lopez and Douglas P. DeMaster editors, Marine Mammal Protection Act and Endangered Species Act implementation program 1999. U.S. Department of Commerce, Seattle, WA. REPRINT FILE.

Bengtson, John L., et al. 2001. Density and distribution of ringed seals along the eastern Chukchi Sea coast, 1999-2000, pp. 89-101 *In*: Anita L. Lopez and Robyn P. Angliss editors, Marine Mammal Protection Act and Endangered Species Act implementation program 2000. U.S. Department of Commerce, Seattle, WA. REPRINT FILE.

Brower, H.K. and R. Opie. 1997. North Slope Borough subsistence harvest documentation project: data for Nuiqsut, Alaska for the period July 1, 1994 to June 30, 1995. Department of Wildlife Management, North Slope Borough. January 14, 1997.

Brueggeman, J.J. and J. Grialou. 2001. Status and use of ringed seals (*Phoca hispida*) breathing holes and lairs in the McCovey Exploration Area, Beaufort Sea, Alaska, December 2000 to May 2001. Prepared for Phillips Alaska, Inc. 18 pp.

Burns, J.J. and S.J. Harbo, Jr. 1972. An aerial census of ringed seals, northern coast of Alaska. Arctic 25(4): 279-290.

Burns, J.J. 1981. Bearded seal – *Erignathus barbatus* Erxleben, 1771. Pp. 145-170, In S.H. Ridgway and R.J. Harrison (eds.), Handbook of Marine Mammal, vol. 2. Seals. Academic Press, New York.

Mansfield, A.W. 1967. Seals of arctic and eastern Canada. Fish. Res. Bd. Can. Bull. 137. 35 pp.

Burns, J. J. and L.F. Frost. 1979. The natural history and ecology of the bearded seal, *Erignathus barbatus*. U.S. Dep. Comm., NOAA, Outer Contin. Shelf Environ. Assess. Prog. Final Report. 19(1983): 311-392.

Federal Register Notice. 1997. Taking and importing of marine mammals: taking of ringed seals incidental to on-ice seismic activities. Vol. 62, no. 207, pp. 55564-55567.

Frost, Kathryn J. and L. F. Lowry. 1999. Monitoring distribution and abundance of ringed seals in northern Alaska. Alaska Department of Fish and Game, Juneau, AK. 37p. + appendix p.

Frost, K.J., L.F. Lowry, J.R. Gilbert, and J.J. Burns. 1988. Ringed seal monitoring: relationships of distribution and abundance to habitat attributes and industrial activities. U.S. Dep. Commer., NOAA, OCSEAP Final Rep. 61 (1989) 344-445.

Frost, K.J. and L.F. Lowry. 1988. Effects of industrial activities on ringed seals in Alaska, as indicated by aerial surveys. P 115-120 In: Alaska OCS Region 1987 Arctic Information Transfer Meeting Conference Proceedings. OCS Study MMS 88-0040. U.S. Minerals Management Service, Anchorage, AK. 245 p plus Appendices.

Fuller, A.S. and J.G. George. 1997. Evaluation of subsistence harvest data from the North Slope Borough 1993 census for eight North Slope villages: for the calendar year 1992. North Slope Borough, Department of Wildlife Management. Barrow, AK. 152 pp.

Kelly, B.P. and L.T. Quakenbush. 1990. Spatiotemporal use of lairs by ringed seals (*Phoca hispida*). Can. J. Zool. 68(12):2503-2512.

Kelly, B.P., L. T. Quakenbush, J.R. Rose. 1986. Ringed seal winter ecology and effects of noise disturbance. Outer Cont. Shelf Environ. Assess. Program, final Rep. Princ. Invest., NOAA, Anchorage, AK 61(1989):477-536. 536 pp. OCS study MMS 89-0026: NIS PB89-234645.

Kelly, B.P., J.J. Burns and L.T. Quakenbush. 1988. Response of ringed seals (*Phoca hispida*) to noise disturbance. p. 27-38 in: W.M. Sackinger, M.O. Jeffries, J.L. Imm and S.D. Treacy (eds.) Port and Ocean Engineering under Arctic Conditions, Vol. ll; Symposium on Noise and Marine Mammals. Geophysical Inst. Univ. AK, Fairbanks. 111 p.

Link, M.R., T.L. Olson and T\M.T. Williams. 1999. Ringed seal distribution and abundance near potential oil development sites in the central Alaskan Beaufort Sea, spring 1998. . LGL Rep. P-430. Rep. from LGL Alaska Res. Assoc., Inc. Anchorage, AK. for BP Exploration (Alaska) Inc., Anchorage, AK 58 pp.

Lydersen, C. and M.O. Hammill. 1993. Diving in ringed seal *(Phoca hispida*) pups during the nursing period. Can. J. Zool. 71(5):991-996.

McLaren, I. A. 1958. The biology of the ringed seal, *Phoca hispida*, in the eastern Canadian Arctic. Bull. Fish. Res. Bd. Can. No. 118.

Miller, G.W., R.E. Elliot and W.J. Richardson. 1998. Ringed seal distribution and abundance near potential oil development sites in the central Alaska Beaufort Sea, spring 1997. LGL Rep. TA2160-3. Rep. from LGL Ltd., King City, Ont., for BP Exploration (Alaska) Inc., Anchorage, AK 36 pp.

Moulton, V.D., R.E. Elliott and M.T. Williams. 2000. Fixed-wing aerial surveys of seals near BP's Northstar and Liberty sites, 2000. LGL Report TA2428-1. Rep. from LGL Ltd, King City, Ont, for BP Exploration (Alaska) inc., Anchorage, AK 31 pp.

Moulton, V.D., R.E. Elliott and M.T. Williams. 2001. Fixed-wing aerial surveys of seals near BP's Northstar and Liberty sites, 2001. LGL Report TA2570-1. Rep. from LGL Ltd, King City, Ont, for BP Exploration (Alaska) inc., Anchorage, AK 31 pp.

Moulton, V.D., M.T. Williams, W. J. Richardson, and T.L. McDonald. 2003. Estimated numbers of seals and whales potentially affected by Northstar Activities, Nov. 2001 to Oct. 2002. In Monitoring of industrial sounds, seals, and bowhead whales near BP's Northstar Oil Development, Alaska Beaufort Sea, 1999-2002. LGL and Greeneridge Sciences Inc. May 2003.

Moulton, V.D. and R.E. Elliott. 2000. Fixed-wing aerial surveys of seals near BP's Northstar and Liberty sites, 1999. LGL Report TA2570-1. Rep. from LGL Ltd, King City, Ont, for BP Exploration (Alaska) inc., Anchorage, AK 72 pp.

National Marine Fisheries Service. 1998. Environmental assessment on regulations governing the taking of ringed and bearded seals incidental to on-ice seismic activities in the Beaufort Sea. U.S. Department of Commerce, 39 p.

Nelson, R.K. 1969. Hunters of the northern ice. Univ. Chicago Press, Chicago Press, Chicago, IL. 429 p.

Popov, L.A. 1976. Status of main ice forms of seals inhabiting waters of the USSR and adjacent to the country marine areas. FAO ACMRR/MM/SC/51. 17pp.

Smith, T.G. and M.O. Hammill. 1981. Ecology of the ringed seal, Phoca hispida, in its fast ice breeding habitat. Can. J. Zool. 59(6): 966-981.

Smith, T.G. and I. Stirling. 1975. The breeding habitat of the ringed seal *(Phoca hispida*). The birth lair and associated structures. Can. J. Zool. 53:1297-1305.

Stirling, I, and W. Calvert. 1979. Ringed seal. p 66-69 In: Mammals in the seas. Vol. 2. Pinniped species summaries and report on Sirenians. FAO Fish Ser. 5.NOAA, NMFS, Alaska Fisheries Science Center.

USFWS. 2000a. Polar Bear: Alaska Chukchi/Bering Seas. Pp. 175-179 *In*: R.C. Ferrero, D.P. DeMaster, P.S. Hill, M.M. Muto, and A.L. Lopez (eds.) Alaska marine mammal stock assessments, 2000. NOAA Technical Memorandum NMFS-AFSC-119. U.S. Dep. Comm. NOAA, NMFS, Alaska Fisheries Science Center.

USFWS. 2000b. Polar bear: Alaska southern Beaufort Sea. Pp. 180-184 *In*: R.C. Ferrero, D.P. DeMaster, P.S. Hill, M.M. Muto, and A.L. Lopez (eds.) Alaska marine mammal stock assessments, 2000. NOAA Technical Memorandum NMFS-AFSC-119. U.S. Dept. Comm. NOAA, NMFS, Alaska Fisheries Science Center.

Wiig, O., A.E. Derocher and S.E. Belikov. 1999. Ringed seal (*Phoca hispida*) breeding in the drifting pack ice of the Barents Sea. Marine Mammal Science, 15(2): 595-598.

Williams, M.T., T.G. Smith, C.J. Perham and J.A. Coltrane. 2001. Location of ringed seal structures in the sea ice near Northstar, winter 2000 and spring 2001. LGL Report P557-1. Rep from LFL Alaska Research Associates, Inc. Anchorage, AK. 24 pp.